AC6329F Datasheet

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Version：V1.3

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AC6329F Features

High performance 32-bit RISC CPU
- RISC 32-bit CPU
- DC-96MHz operation
- 73KB data RAM
- 8KB I-cache 2way
- 1KB Rocache 1way
- 64 Vectored interrupts
- 8 Levels interrupt priority

Flexible I/O
- 11 GPIO pins
- All GPIO pins can be programmable as input or output individually
- All GPIO pins are internal pull-up/pull-down selectable individually
- CMOS/TTL level schmitt triggered input
- External wake up/interrupt on all GPIOs

Peripheral Feature
- One Full Speed USB OTG controller
- Four Multi-function 32-bit timers, support capture and PWM mode
- Three full-duplex advanced UART(DMA)
- Three SPI interface supports host and device mode（DMA）
- One IIC interface supports host and device mode
- RTC,with alarm clock and time base to wake up the chip
- 16-bit PWM generator for motor driving
- Three IQ Encoder

- 7 channels 10-bit ADC
- 1 channel 8 levels Low Power Detector
- Embedded PMU support low power mode
- 2 Crystal Oscillator
- Watchdog
- Power-on reset

Bluetooth Feature
- CMOS single-chip fully-integrated radio and baseband
- Compliant with Bluetooth V5.4+BR+EDR+BLE specification
- Bluetooth Piconet and Scatternet support
- Meet class2 and class3 transmitting power requirement
- Support GFSK and $\pi/4$ DQPSK all packet types
- Maximum +8dBm transmitting power
- EDR receiver with -93dBm sensitivity
- Support a2dp\avctp\avdtp\avrcp\hfp\spp\smp\att\gap\gatt\rfcomm\sdp\l2cap profile

Power Supply
- VDDIO is 1.8V to 3.4V

Packages
- SOP16

Temperature
- Operating temperature: -40℃ to +85℃
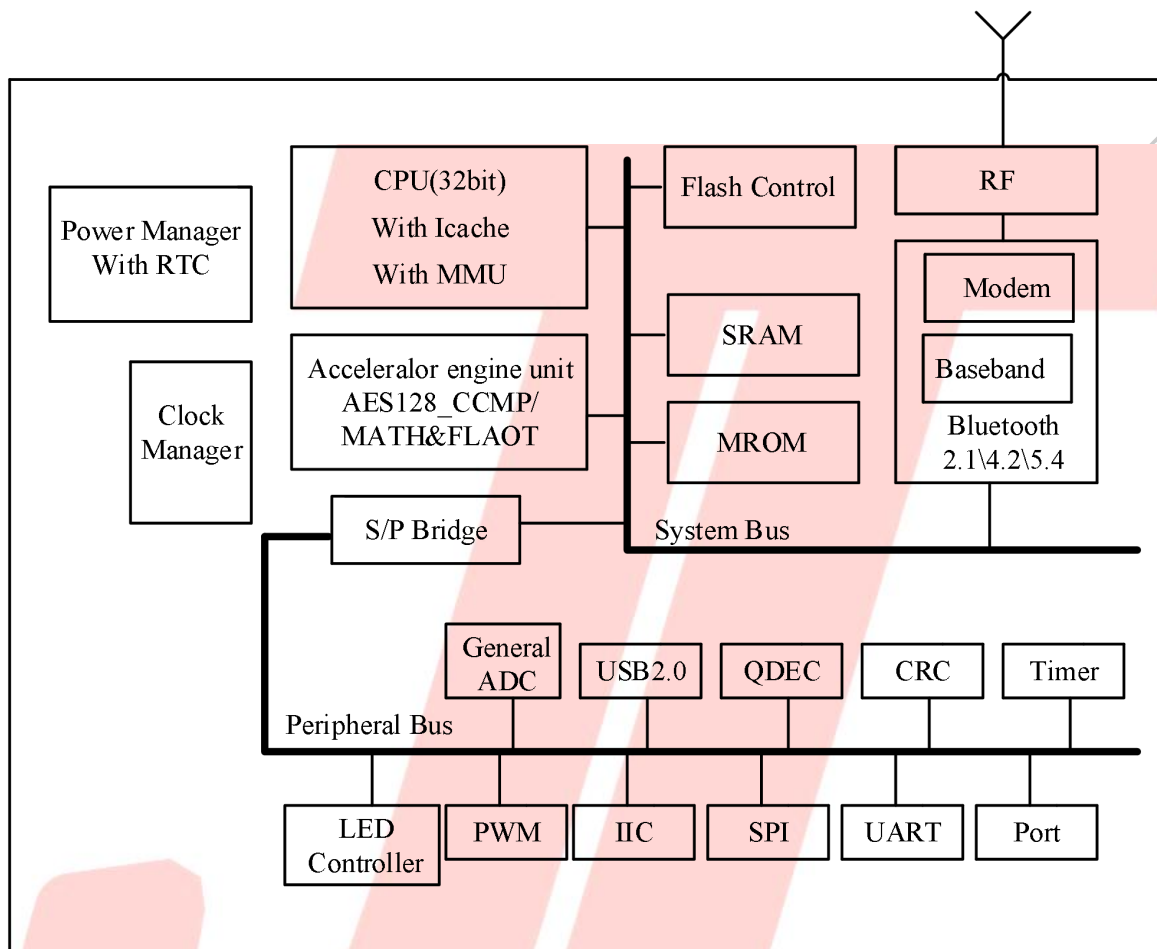- Storage temperature: -65℃ to +150℃

1. Block Diagram

Figure 1-1   AC6329F_SOP16 Block Diagram
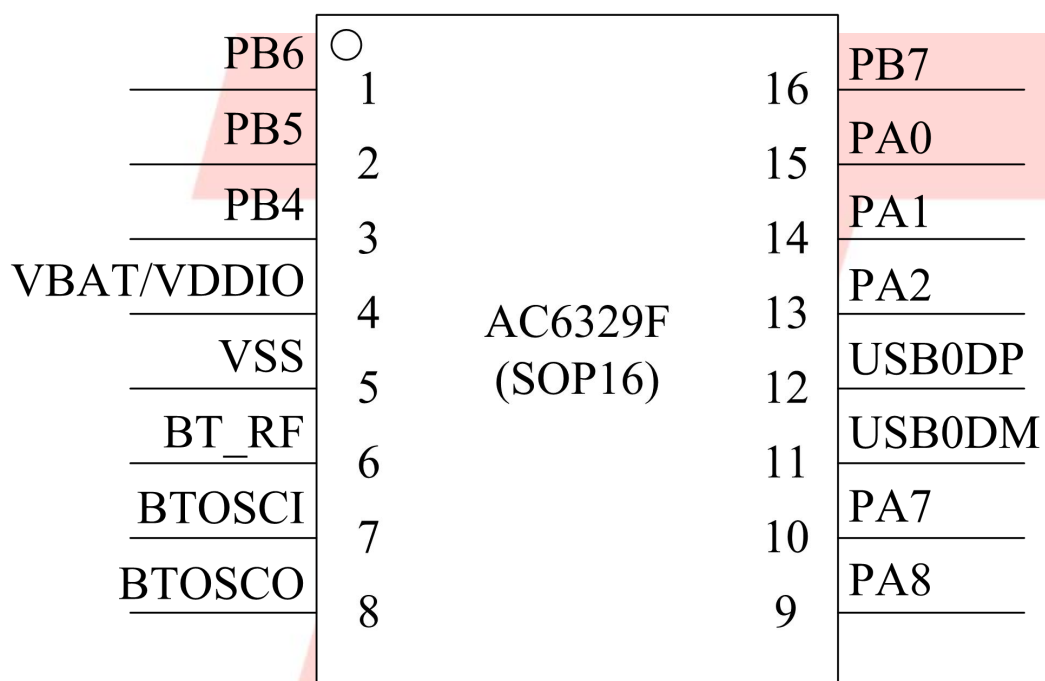
2. Pin Definition

2.1 Pin Assignment

```
              ┌─○───────────────┐
        PB6 ──┤1               16├── PB7
        PB5 ──┤2               15├── PA0
        PB4 ──┤3               14├── PA1
  VBAT/VDDIO ─┤4    AC6329F    13├── PA2
        VSS ──┤5    (SOP16)    12├── USB0DP
      BT_RF ──┤6               11├── USB0DM
      BTOSCI ─┤7               10├── PA7
      BTOSCO ─┤8                9├── PA8
              └─────────────────┘
```

Figure 2-1   AC6329F_SOP16 Package Diagram

2.2 Pin Description

Table 2-1   AC6329F_SOP16 Pin Description

PIN NO.	Name	I/O Type	Function	Other Function
1	PB6	I/O	GPIO	SPI2_CLKA: SPI2 Clock(A) ; ADC12: ADC Channel 12; UART2_TXC: Uart2 Data Out(C); TMR3CK;
2	PB5	I/O	GPIO (High Voltage)	SPI2_DIA: SPI2 Data In(A); UART1_RXA: Uart1 Data In(A); PWMCH3L;
3	PB4	I/O	GPIO	TMR2: Timer2 Clock In; Q-decoder2_0; SPI1_DIB: SPI1 Data In(B); ADC9: ADC Channel 9; UAR1_TXA: Uart1 Data Out(A); PWMCH3H;
4	VBAT	P	LDO Power	-
	VDDIO	P	IO Power 3.3V	-
5	VSS	P	GND	
6	BT_RF	-	RF Antenna	-
7	BTOSCI	I	BTOSCI	-
8	BTOSCO	O	BTOSCO	-
9	PA8	I/O	GPIO	TMR3: Timer3 Clock In; SPI1_DOA: SPI1 Data Out(A); IIC_SDA_C: IIC SDA(C); ADC4: ADC Channel 4; UART1_RXC: Uart1 Data In(C); PWMCH1L;
10	PA7	I/O	GPIO	TMR1: Timer1 Clock In; SPI1_CLKA: SPI1 Clock(A) ; IIC_SCL_C: IIC SCL(C); ADC3: ADC Channel 3; UART1_TXC: Uart1 Data Out(C); PWMCH1H;

11	USB0DM	I/O	GPIO (pull down)	SPI2_DOB: SPI2 Data Out(B); IIC_SDA_A: IIC SDA(A); ADC11: ADC Channel 11; UART1_RXD: Uart1 Data In(D);
12	USB0DP	I/O	GPIO (pull down)	SPI2_CLKB: SPI2 Clock(B); IIC_SCL_A: IIC SCL(A); ADC10: ADC Channel 10; UART1_TXD: Uart1 Data Out(D);
13	PA2	I/O	GPIO	CAP3: Timer3 Capture; Q-decoder0_1; UART0_RXC: Uart0 Data In(C); UART1_RTS;
14	PA1	I/O	GPIO	PWM0: Timer0 PWM Output; Q-decoder0_0; ADC0: ADC Channel 0; UART0_TXC: Uart0 Data Out(C); UART1_CTS;
15	PA0	I/O	GPIO (High Voltage)	CLKOUT1; UART2_TXB: Uart2 Data Out(B); UART2_RXB: Uart2 Data In(B); PWMCH0H;
16	PB7	I/O	GPIO (High Voltage)	SPI2_DOA: SPI2 Data Out(A); UART2_RXC: Uart2 Data In(C);

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

Table 3-1

Symbol	Parameter	Min	Max	Unit
Topt	Operating temperature	-40	+85	°C
Tstg	Storage temperature	-65	+150	°C
VDDIO	3.3V IO Input Voltage	-0.3	3.6	V

Note : The chip can be damaged by any stress in excess of the absolute maximum ratings listed below

3.2 Recommended Operating Conditions

Table 3-2

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VDDIO	Voltage input	1.8	3.0	3.4	V	
I_{VDDIO}	Loading current	_	_	60	mA	

3.3 IO Input/Output Electrical Logical Characteristics

Table 3-3

IO input characteristics						
Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V_{IL}	Low-Level Input Voltage	-0.3	_	0.3* VDDIO	V	VDDIO = 3.3V
V_{IH}	High-Level Input Voltage	0.7* VDDIO	_	VDDIO+0.3	V	VDDIO = 3.3V
IO output characteristics						
V_{OL}	Low-Level Output Voltage	_	_	0.33	V	VDDIO = 3.3V
V_{OH}	High-Level Output Voltage	2.7	_	_	V	VDDIO = 3.3V

3.4 Internal Resistor Characteristics

Table 3-4

Port	Drive Strength	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PA1-PA8, PB4,PB6,	drive_select[11] 24mA drive_select[10] 24mA (with 120ohm res) drive_select[01] 8mA drive_select[00] 8mA (with 120ohm res)	10K	10K	1. USB0DM&USB0DP default pull down 2. Internal pull-up/pull-down resistance | accuracy ±20% 5.PA0,PB5,PB7 can pull-up resistance to 5V
PA0,PB5, PB7	8mA	10K	10K	
USB0DP USB1DP	4mA	1.5K	15K	
USB0DM USB1DM	4mA	180K	15K	

3.5 BT Characteristics

3.5.1 Transmitter

Basic Rate   Table 3-5

Parameter		Min	Typ	Max	Unit	Test Conditions
RF Transmit Power		-	4	6	dBm	25℃, Power Supply VBAT=3.7V 2441MHz DH5
RF Power Control Range		-	20	-	dB	
20dB Bandwidth		-	950	-	KHz	
In-band spurious Emissions (BQB Test Mode RF_Tx Power=4dBm)	$F=F_0\pm1MHz$	-	-20	-	dBm	
	$F=F_0\pm2MHz$	-	-45	-	dBm	
	$F=F_0\pm3MHz$	-	-35	-	dBm	
	$F=F_0\pm>3MHz$	-	-40	-	dBm	

Enhanced Data Rate   Table 3-6

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power		-	-1	-	dB	25℃, Power Supply VBAT=3.7V 2441MHz 2DH5
π/4 DQPSK Modulation Accuracy	DEVM RMS	-	4	-	%	
	DEVM 99%	-	12	-	%	
	DEVM Peak	-	9	-	%	
In-band spurious Emissions (BQB Test Mode RF_Tx Power=4dBm)	$F=F_0\pm1MHz$	-	-4	-	dBm	
	$F=F_0\pm2MHz$	-	-30	-	dBm	
	$F=F_0\pm3MHz$	-	-30	-	dBm	
	$F=F_0\pm>3MHz$	-	-37	-	dBm	

3.5.2 Receiver

Basic Rate   Table 3-7

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-91	-	dBm	
Co-channel Interference Rejection		-	6	-	dB	25℃,
Adjacent Channel selectivity C/I	+1MHz	-	-7	-	dB	Power Supply
	-1MHz	-	-7	-	dB	VBAT=3.7V
	+2MHz	-	-37	-	dB	
	-2MHz	-	-39	-	dB	2441MHz
	+3MHz	-	-32	-	dB	DH5
	-3MHz	-	-43	-	dB	

Enhanced Data Rate   Table 3-8

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-93	-	dBm	
Co-channel Interference Rejection		-	8	-	dB	25℃,
Adjacent Channel selectivity C/I	+1MHz	-	-14	-	dB	Power Supply
	-1MHz	-	-15	-	dB	VBAT=3.7V
	+2MHz	-	-36	-	dB	
	-2MHz	-	-39	-	dB	2441MHz
	+3MHz	-	-29	-	dB	2DH5
	-3MHz	-	-43	-	dB	

3.5.3 BLE

1M Data Rate   Table 3-9

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-95	-	dBm	
RF Transmit Power		-	6.5	8	dBm	
In-band Spurious Emission	|M-N|=2MHz	-	-35	-	dBm	25℃
	|M-N|≥3MHz	-	-33	-	dBm	Power Supply
Modulation Characteristics	Δf1 avg	-	250	-	KHz	VBAT=3.7V
	Δf2 99%	-	210	-	KHz	2440MHz
	Δf1avg/Δf2avg	-	0.9	-	/	
Carrier Frequency Offset		-15	-	+15	KHz	
Frequency Drift		-25	-	+25	KHz	
Frequency Drift Rate		-5	-	+5	KHz/50us	

2M Data Rate   Table 3-10

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity		-	-92	-	dBm	
RF Transmit Power		-	6.5	8	dBm	
In-band Spurious Emission	|M-N|=4MHz	-	-40	-	dBm	
	|M-N|=5MHz	-	-40	-	dBm	25℃
	|M-N|≥6MHz	-	-40	-	dBm	Power Supply
Modulation Characteristics	Δf1 avg	-	500	-	KHz	VBAT=3.7V
	Δf2 99%	-	430	-	KHz	2440MHz
	Δf1avg/Δf2avg	-	0.9	-	/	
Carrier Frequency Offset		-20	-	+20	KHz	
Frequency Drift		-25	-	+25	KHz	
Frequency Drift Rate		-5	-	+5	KHz/50us	

Long Range   Table 3-11

Parameter	Min	Typ	Max	Unit	Test Conditions
Sensitivity LE 125K(S8)	-	-102	-	dBm	VBAT=3.7V,25℃
Sensitivity LE 500K(S2)	-	-99	-	dBm	2440MHz

4. Package Information

4.1 SOP16(9.9mm*6mm)

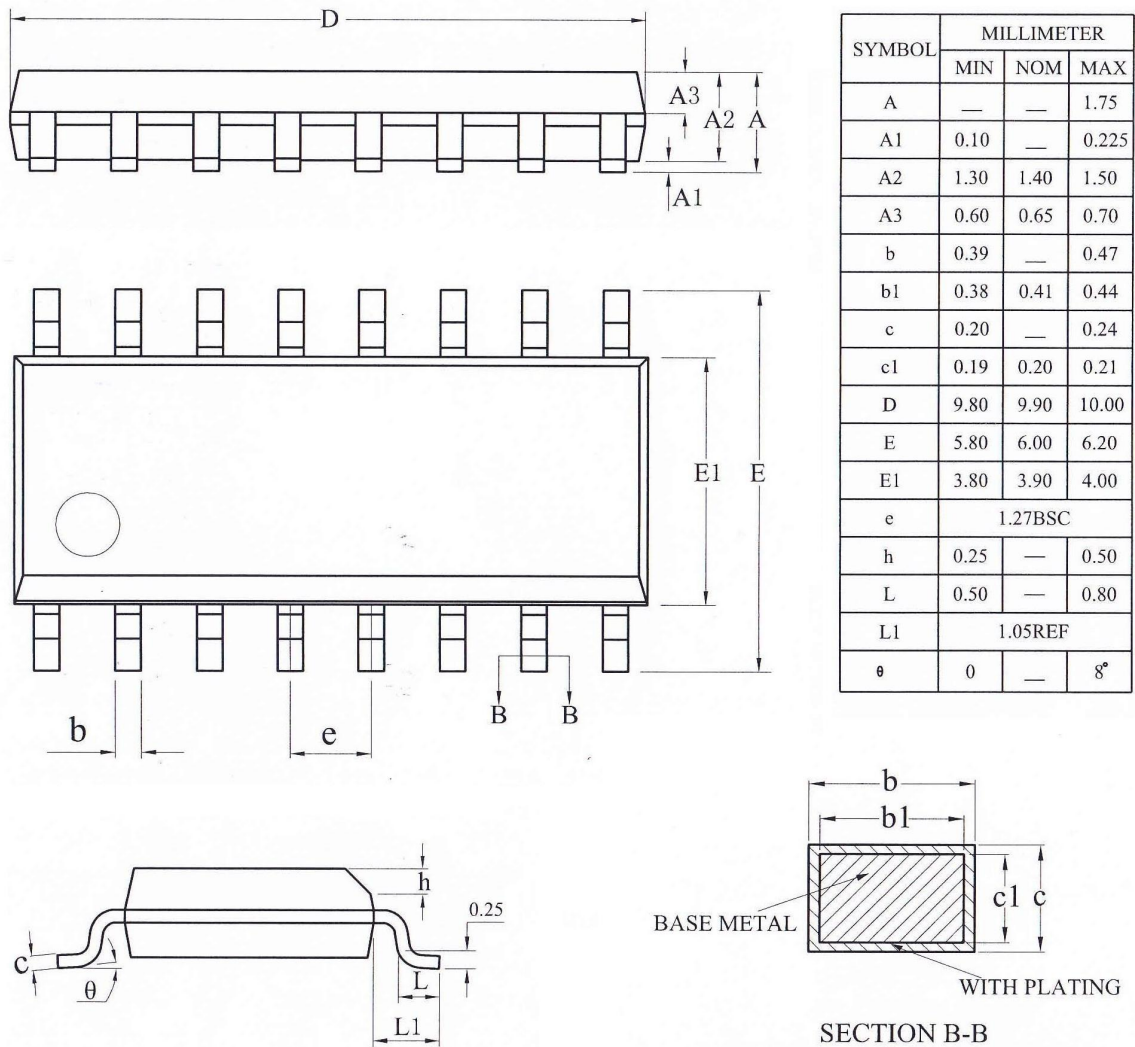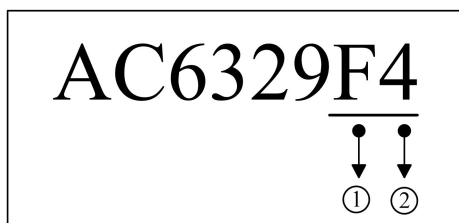| SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.47
b1	0.38	0.41	0.44
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

Figure 4-1   AC6329F_SOP16 Package

5. Package Type Specification

AC6329<u>F</u><u>4</u>
① ②

①Represents different packages

②Represents different memory sizes

    2: 2Mbit Flash

    4: 4Mbit Flash

6. Revision History

Date	Revision	Description
2021.03.05	V1.0	Initial Release
2022.07.19	V1.1	Update Bluetooth Feature
2023.11.28	V1.2	Add BLE parameter
2023.12.13	V1.3	Update Bluetooth Feature